DRAFT CRUISE INSTRUCTIONS
FOCI

R/V *KILO MOANA*, Cruise KM0305
April 18 – May 23, 2003
Chief Scientist Leg 1 – William J. Floering, NOAA
Chief Scientist Leg 2 – Nancy B. Kachel, NOAA

1.0 DRAFT CRUISE INSTRUCTIONS

1.1 Cruise Title – Fisheries-Oceanography Coordinated Investigations (FOCI).

1.2 Cruise Numbers

1.2.1 Cruise Number – KM0305

1.2.2 FOCI Number – 1KM03 and 2KM03.

1.3 Cruise Dates – April 18 – May 23, 2003

1.3.1 Departure – Leg 1 – Depart Kodiak, Alaska, at 1000 on Friday, April 18, 2003.

1.3.2 Arrival – Leg 1 – Arrive Kodiak, Alaska, on Saturday, April 26, 2003. Unloading of some equipment and a change of most of the scientific personnel will take place during the in-port.

1.3.3 Departure – Leg 2 – Depart Kodiak, Alaska, on Monday, April 28, 2003.

1.3.4 Touch-and-Go – Seward, Alaska, on Friday, May 16, 2003, to disembark one of the scientists (Dr. Mordy) and some small equipment.

1.3.5 Arrival – Leg 2 – Arrive Kodiak, Alaska, Saturday, May 23, 2003.

1.4 Operating Area – Gulf of Alaska

2.0 CRUISE OVERVIEW

2.1 Cruise Objectives – Fisheries-Oceanography Coordinated Investigations (FOCI) is an effort by National Oceanic and Atmospheric Administration (NOAA) and associated academic scientists. FOCI's goal is to understand the effects of abiotic and biotic variability on ecosystems of the North Pacific Ocean and Bering Sea in order to discern the physical and biological processes that determine recruitment variability of commercially valuable finfish and shellfish stocks in Alaskan waters. This cruise is in support of the United States Global Ocean Ecosystems Dynamics (U.S. GLOBEC) and the Steller Sea Lion Research Programs. This cruise is being undertaken by FOCI in support of research into the physical, chemical,

and biological mechanisms acting in the coastal Gulf of Alaska making it one of the most productive ecosystems on earth.

We will focus our efforts on the physical, chemical and biological processes occurring in particular areas of this region. These include: several troughs of differing size, banks, the area near Kennedy – Stevenson Entrances, as well as one of the large offshore eddies, that typically impact this area between April and July and contribute to on and offshore fluxes.

The first leg will involve the recovery of 15 moorings, and the deployment of 14 moorings, which includes two 2.3-meter diameter surface fiberglass-over-foam toroid moorings, in addition to Conductivity, Temperature, and Depth (CTD) profile operations at each mooring site. If additional funding is received, approximately nine more mooring deployments will be added to the Leg 1 cruise plan.

The second leg will involve nearly continuous operations at CTD/Bongo stations. If conditions permit, an intensive eddy experiment involving ARGOS satellite-tracked drifters and CTD/Bongo stations will be conducted. Water samples will be taken for nutrients, chlorophyll, phytoplankton identification, and salinity calibrations. Sampling in canyons and troughs will investigate the movement and mixing of offshore waters up the trough, and the subsequent mixing. These troughs are conduits for nutrient-rich water from offshore to the inner shelves of Kodiak Island. They are also pathways for some types of fish larvae to move from the spawning region on the slope inshore to the bays, while juveniles of other species use the troughs as pathways to move offshore. At this time of year, the circulation pattern of the Alaska Coastal Current in the vicinity of Kennedy-Stevenson Entrances changes, and we hope to document that change. To do so we plan to occupy of box of CTD stations north and east of Afognak Island (Kodiak Island), at the beginning, middle and end of the cruise. We also hope to sample a large anti-cyclonic eddy feature commonly present against the slope at this time of year. CTD/Bongo sampling will be augmented with phytoplankton sampling across the eddy and in the zone where the eddy impinges on the slope/shelf.

Approximately five ARGOS satellite-tracked drifters will be deployed during the course of the two legs.

2.2 Participating Organizations

NOAA – Pacific Marine Environmental Laboratory (PMEL)
7600 Sand Point Way N.E., Seattle, Washington 98115-6439

NOAA – Alaska Fisheries Science Center (AFSC)
7600 Sand Point Way N.E., Seattle, Washington 98115-0070

2.3 Personnel

2.3.1 Chief Scientists

2.3.1.1 Leg 1

Name	Gender	Affiliation	E-mail Address
William Floering (206) 526-6480	Male	PMEL	William.Floering@noaa.gov

2.3.1.2 Leg 2

Name	Gender	Affiliation	E-mail Address
Nancy B. Kachel (206) 526-6780	Female	PMEL	Nancy.Kachel@noaa.gov

2.3.2 Participating Scientists

2.3.2.1 Leg 1

Name	Gender	Affiliation	E-mail Address
William Floering	Male	PMEL	William.Floering@noaa.gov
Dr. Calvin Mordy	Male	PMEL	Calvin.W.Mordy@noaa.gov
Carol DeWitt	Female	PMEL	Carol.Dewitt@noaa.gov
Earl Roskie	Male	PMEL	Earl.Roskie@noaa.gov
Rick Miller	Male	PMEL	Hendrick.V.Miller@noaa.gov
Steve Smith	Male	PMEL	Stephen.A.Smith@noaa.gov
TBA		AFSC	
TBA		AFSC	

2.3.2.2 Leg 2

Name	Gender	Affiliation	E-mail Address
Nancy Kachel	Female	PMEL	Nancy.Kachel@noaa.gov
Dr. Calvin Mordy	Male	PMEL	Calvin.W.Mordy@noaa.gov
Dr. Carol Ladd	Female	PMEL	Carol.Ladd@noaa.gov
David Kachel	Male	PMEL	Dave.Kachel@noaa.gov
Peter Proctor	Male	PMEL	Peter.Proctor@noaa.gov
TBA		PMEL	
TBA		PMEL	
TBA		AFSC	
TBA		AFSC	
TBA		AFSC	

2.4 Administrative

2.4.1 Ship Operations

University of Hawaii – University Marine Center (UMC)
#1 Sand Island Road
Honolulu, Hawaii 96819
Telephone: (808) 847-2661
Facsimile: (808) 848-5451
Email: snug@soest.hawaii.edu

2.4.2 Scientific Operations

Dr. Phyllis J. Stabeno, PMEL
Telephone: (206) 526-6453
E-mail: Phyllis.Stabeno@noaa.gov

Dr. Jeffrey M. Napp, AFSC
Telephone: (206) 526-4148
E-mail: Jeff.Napp@noaa.gov

3.0 OPERATIONS

3.1 Responsibilities

3.1.1 Master – The ship's Master shall be in sole command of the vessel and shall be responsible for the welfare of all personnel on board. The Master shall be the final authority in matters relating to the safety, proper navigation, stability, and sailing condition of the vessel and shall execute each voyage with the utmost dispatch.

The Master shall inform the Chief Scientist as soon as possible of any changes in the program necessitated by events. In the case of emergency, nothing in these instructions shall be construed as preventing the Master from taking the most effective action which, in the Master's judgment, will rectify the situation causing the emergency, and; thereby, safeguard life, property, and the ship.

The Master will have the authority to abort operations temporarily on the basis of clear and present danger to life and property at sea, and will inform the Chief Scientist as soon as safe conditions permit. Full details of the action taken, rationale, and recommendations will be provided at the earliest opportunity. Under normal operating conditions, the Master shall not take any mission-aborting action without consultation with the Chief Scientist.

3.1.2 Chief Scientist – The Chief Scientist is responsible for executing the technical portion of the scientific mission specified by these instructions. Responsibilities also include:

1. Comportment of visiting scientists and technicians,
2. Disposition of data, feedback on data quality, and archiving of data and specimens collected,
3. Administration and physical handling of all scientific party hazardous materials,
4. Assignment of berthing for the scientific party,
5. Cleanliness of all berthing, laboratory, and storage spaces used by the scientific party,
6. Delivery of medical and emergency contact forms for the scientific party, and
7. With the Master, safe, efficient, and economical use of shipboard resources to support the embarked mission.

The Chief Scientist has the authority to revise or alter the technical portion of the instructions as work progresses provided that, after consultation with the Master, it is ascertained that the proposed changes will not:

1. Jeopardize the safety of personnel or the ship,
2. Exceed the overall time allotted for the project,
3. Result in undue additional expenses, or
4. Alter the general intent of these project instructions.

3.1.3 **Scheduling** – Scheduling of individual activities will depend upon weather conditions and progress of scientific work. Therefore, firm advance scheduling of events will not be possible, and a continual dialogue between scientific and ship's personnel will be important.

3.2 **Data To Be Collected** – The Chief Scientist is responsible for the disposition, feedback on data quality, and archiving of data and specimens collected on board the ship for the primary project. The Chief Scientist will be considered the representative of the Directors of PMEL and AFSC for purpose of data disposition. A single copy of all data gathered by the vessel shall be delivered to the Chief Scientist for forwarding to the Center and Laboratory Directors, who in turn will be responsible for distribution of data to other investigators desiring copies.

3.2.1 **Data Logging** – If the ship has a computer system that operates throughout the cruise acquiring and logging data from navigation, meteorological, and flow-through oceanographic sensors, it is requested that we receive a copy of the data at the end of the cruise. If the navigational data for stations are not recorded on such a system, it is requested that the ship maintain a Marine Observation Abstract (MOA) log provided by the scientists of times, positions, and meteorological conditions for each station.

At regular intervals, not to exceed every five days, the ship's computer manager will archive data from disk files to recordable compact diskettes (CD-R) for delivery to the Chief Scientist at the end of the cruise. Additional recording of processed data may be requested of the ship's computer manager. The ship's computer manager will ensure data quality. During the cruise, the scientific party may require the assistance of the ship's computer manager to determine if all sensors are functioning properly and to monitor some of the collected data in real time to make sampling strategy decisions.

3.2.2 **Marine Observation Abstract (MOA)** – If the navigational data for stations are not recorded on the ship's data logger, it is requested that the ship maintain a MOA form during the cruise. The critical information to be recorded at each station is:

- Coordinated Universal Time (UTC) date,
- UTC time,
- Position,
- Station number,
- Haul number,
- Gear type, and
- Bottom depth.

3.3 **Staging Plan** – Loading of scientific equipment is planned to occur in Kodiak, Alaska, on Thursday, April 17, 2003. The scientific party will be responsible for arranging vehicles and for moving their equipment from the airport and/or docks to the ship.

3.4 **De-staging Plan** – Most of the mooring equipment will be off-loaded in Kodiak, Alaska, at the end of Leg 1 on Saturday, April 26, 2003. All the remaining gear will be offloaded in Kodiak, Alaska, at the end of the cruise on Friday, May 23, 2003. The scientific party will be responsible for arranging vehicles for moving their equipment to the airport and/or docks.

3.5 **Cruise Plan** – On the first leg of the cruise, we plan to recover 15 and deploy 14 current meter/biophysical moorings. Most of these will be in water depths between 100 and 300 meters. Included among these moorings is one surface toroid to be recovered at the FATE (Fisheries and the Environment) site (58° 15.6' N, 147° 41.2' W) and one surface toroid to be recovered and redeployed at the GLOBEC OSCAR site, GBM-3 (59° 18.0' N, 148° 58.2' W).

CTD/PAR/Fluorescence profiler casts will be done on both legs. The Uncontaminated Scientific Seawater System (USSW) with thermosalinograph, fluorometer, and a PMEL-supplied nitrate meter attached will be used throughout the entire cruise.

On the second leg, Marine Assessment Monitoring and Prediction (MARMAP) Bongo tows will be taken at many of the CTD stations. Salinity, nutrient, and chlorophyll samples will be taken at up to 12 depths at most CTD stations. Nutrients need to be stored in a +4° Celsius refrigerator until they are processed on board the ship. Approximately 4 cubic feet are need for this storage. Chlorophyll samples will be filtered and the filters stored in a -20° Celsius freezer. After the Touch-and-Go on Friday, May 16, nutrient samples will need to be fast-frozen (at approximately -80°C) before being moved to a -20°C freezer. The freezer space needed for these samples is approximately 2 cubic feet at -80°C. The combined space needed in the -20°C freezer is 12-16 cubic feet.

Approximately five ARGOS satellite-tracked drifter buoys will be deployed during the 2 legs of the cruise.

3.5.1 **Leg 1** – See Section 9.3.1 KM0305 Leg 1 – Mooring Location for a chartlet of Leg 1. We plan to depart from Kodiak, Alaska, at 1000 on Friday, April 18, 2003. Generally, we plan to deploy moorings during day light hours. Before recoveries and after deployments, calibration CTD casts will be taken.

3.5.1.1 **Chiniak Bay** – We will begin operations on Friday, April 18, 2003, by recovering and re-deploying one subsurface mooring in the trough east of Chiniak Bay.

3.5.1.2 **Gore Point** – Three subsurface moorings will be recovered and redeployed at sites GP-32, GP-34, and GP-36.

3.5.1.3 **GLOBEC Line** – Nine subsurface moorings will be recovered and seven deployed along the GLOBEC mooring line, along with the recovery and re-deployment of one surface toroid at the GLOBEC OSCAR site.

3.5.1.4 **FATE Site** – One surface mooring will be recovered at the FATE site.

3.5.1.5 **Barnabus Canyon** – One subsurface mooring will be deployed.

3.5.1.6 **Chiniak Bay** – One subsurface mooring will be deployed.

A weather day has been added to the schedule to ensure enough time to complete the mooring work. If the work is completed without using the weather day, we plan to arrive on Friday, April 25, 2003, in Kodiak, Alaska, where the scientists for the next leg will embark.

3.5.2 **Leg 2** – See Section 9.3.2 KM0305 Leg 2 – Transect Lines for a chartlet of transects for Leg 2. The work on Leg 2 will consist of around the clock CTD casts and MARMAP Bongo tow stations. Full complements of sample bottles will be fired during most casts, to sample for nutrients, chlorophyll, and salinity, as well as phytoplankton samples for preservation.

We plan first to sample a box of stations east and north of Kodiak Island, Alaska, repeating this box two more times, in the middle, and toward the end of the cruise. We will then proceed to sample a long line of stations stretching along the Kenai Peninsula, Alaska, in support of U.S. GLOBEC program.

At the completion of the above stations, we will probably proceed to sample one of the eddies that regularly impinge on the shelf in this region. The position of eddies can be tracked via satellite altimetry data. Altimetry data in Section 9.3.3 TOPEX POSEIDON Altimetry Data from June 1, 2002 illustrates the position of such an eddy collected last year by the Altimetry Research in Ocean Circulation (TOPEX POSEIDON), conducted jointly by the National Aeronautics and Space Administration (NASA) and the French agency Centre Nationale d'Études Spatiales (CNES). Scientists at PMEL will track a candidate eddy's position and keep us apprised of its position. We are interested in studying an eddy located **AS FAR EAST AS KAYAK ISLAND,** although a position similar to 2001 or 2002 is more likely in May. The exact positions will be unavailable until just before the time of the study. Shown on the preliminary map of the cruise are idealized positions of lines of stations from sampling in early June 2002. This year, in addition to the large X-pattern, we plan several short transect lines of approximately five CTD stations, each along the shoreward side of the eddy, in the region of the shelf break. The experiment will involve the deployment of two ARGOS satellite-tracked drifter buoys, followed by occupation of a series of CTD and MARMAP Bongo stations spaced 15 to 20 kilometers apart. Water samples for nutrients and chlorophyll will also be collected at each station and nutrients will be analyzed on board the ship. We will also collect and preserve water samples for phytoplankton identification ashore. If time permits, later in the cruise, we would be interested in repeating the eddy sampling.

After the eddy experiment, we plan to occupy a transect across Hinchinbrooke Canyon (approximate longitude 147° W) three times in 25 hours.

After that, we shall resume station work in the area of Amatouli Trough, where it is planned to occupy three lines, three times each. This should take 25 hours per line. This should allow us to ascertain the effects of tides on our results. MARMAP Bongo nets will be towed on the second occupation of each transect.

We then plan to reoccupy the box of stations northeast of Afognak Island (Kodiak).

Sampling in Chiniak and Stevenson Canyons will consist of several transects of CTD/Bongo stations. To investigate the movement and mixing of offshore waters up the troughs, and the subsequent mixing, we plan to spend 25 hours repetitively occupying three stations on the east side, then repeat this type of sampling at three stations on the west side if time permits.

At the end of the cruise, if time permits, we plan to reoccupy the box of stations northeast of Afognak Island (Kodiak) one more time.

3.5.3 **Station Locations** – See Section 9.2 Tables for a full listing of station locations. Chartlets of the proposed cruise track for each leg are found in Section 9.3 Figures.

3.6 **Station Operations** – The following are operations to be conducted on this cruise:

3.6.1 **CTD/Water Sample Operations** – A Sea-Bird Electronics' SBE 911*plus* Conductivity, Temperature, and Depth (CTD) profiler with dual temperature and conductivity sensors will be the primary system. The primary 911*plus* CTD system is requested to be provided by the vessel. A backup will be provided and maintained by Pacific Marine Environmental Laboratory (PMEL). When available, and where possible, FOCI's fluorometer and PAR light meter should be mounted on the CTD stand for all casts; however, these instruments cannot exceed the following depths:

- WETLabs' WETStar fluorometer cannot exceed 600 meters, and
- Biospherical Instruments' QSP-200L4S light meter cannot exceed 1,000 meters.

Samples will be collected using the vessel's 9.5-liter Niskin bottles, backed up by 5- and 10-liter Niskin bottles provided by PMEL.

Once the CTD has been deployed, it should be lowered to 10 meters, and then the deck unit should be turned on. After 45 seconds, the CTD can be returned to just below the surface. Then the data acquisition program and VHS cassette CTD tape backup system should be started. The CTD should descend at a rate of 30 meters per minute for the first 200 meters and 45 meters per minute below that. The ascent rate should be 50 meters per minute. An entry in the Marine Observation Abstract (MOA) should be made for each CTD cast at the maximum cast depth.

Scientists will keep the ***CTD Cast Information/Rosette Log***. Pressure, primary salinity, secondary salinity, primary temperature, secondary temperature, fluorescence, and light levels will be recorded on the ***CTD Cast Information/Rosette Log*** for all water bottle samples.

3.6.1.1 **CTD Calibration** – Salinity samples will be taken on every other cast, or as specified by the Chief Scientist. No reversing thermometers will be required. The CTD systems will be equipped with dual temperature and conductivity sensors. Salinity samples will be returned to Seattle for analysis.

3.6.2 **MARMAP Bongo Tows** – A 60-cm aluminum bongo frame with 0.505-mm mesh nets, or 0.333-mm before mid-May, hard plastic cod-ends, and a 40-kg lead weight for a depressor will be used in standard Marine Assessment Monitoring and Prediction (MARMAP) Bongo tows. The nets will be deployed at a constant wire speed of 40-45 meters per minute to a maximum depth of 100 meters, or 200 meters before mid-May, or 5-10 meters off bottom in shallower waters.

A Sea-Bird Electronics SBE 19 SEACAT Profiler or SBE 39 Temperature and Pressure Recorder will be attached to the wire above the bongo frame(s) to provide tow data. The Pacific Marine Environmental Laboratory (PMEL) will provide the primary SEACAT, or SBE 39.

After the bridge gives permission, ship's personnel and one or two scientists will deploy and recover the bongo array. A scientist will monitor the depth of the Bongo nets using a ScanMar (hydrophone) system and inform the ship's winch operator when the desired gear depth is reached. The bridge will then be instructed by the scientist to enter the position in the Marine Observation Abstract (MOA). Afterwards, the winch operator will be instructed by the scientist to retrieve the nets at a wire speed of 20 meters per minute. The ship's speed should be adjusted to maintain a wire angle of 45° during the entire tow, which is accomplished by relaying wire angles to the bridge by radio. When the nets reach the surface, first the ScanMar, then the nets will be recovered. After the nets are brought aboard, they are hosed with saltwater to wash the sample into the cod-end. In some cases, larvae are sorted and preserved separately. Flow meters in the nets record the amount of water filtered, and the SBE 19 SEACAT, or SBE 39, records the depth history of the tow. Data from the SEACAT will be downloaded onto a computer. The scientists on watch are responsible for recording times, maximum depth, wire outs, and flow meter counts on the Cruise Operations Database (COD) forms. Tows not meeting specifications may be repeated at the discretion of the scientific watch (i.e. hit bottom, poor wire angles, nets tangled, etc.)

3.6.3 **Chlorophyll/Nutrient Sampling Operations** – Chlorophyll samples will be collected simultaneously with Conductivity, Temperature, and Depth (CTD) profiler casts from the 10-liter Niskin bottles. The scientists will be responsible for collection, filtration, and preservation of samples. Sampling depths depend on the fluorescence profile. A typical strategy would be samples at 0, 10, 20, 30, 40, and 50 or 60 meters, depending upon which of the latter two depths is closest to the fluorescence maximum. If the maximum is deeper than 60 meters, sampling should be moved deeper with fewer samples in the mixed layer. Nutrient samples will be collected from all Niskin bottles, both near-surface and from depth. Nutrient samples will be taken from bottles fired throughout the water column.

The -20° Celsius freezer is required for sample storage of the chlorophyll filters. The +4°C refrigerator is required for storage of nutrient samples before they are analyzed. Until May 16, all nutrient samples will be analyzed onboard ship. After that, they need to be flash frozen (-80°C freezer is best) and then stored in the -20°C freezer. It is requested that samples stay aboard ship until it arrives in Seattle on June 17.

3.6.4 **ARGOS Satellite-Tracked Drifter Buoy Deployments** – Two to three working days before deployment, the Chief Scientist, or designee, will secure the drifter on the back deck. The drifter buoy is then turned on, usually by removing the magnet, and an e-mail message will be sent by the Chief Scientist, or designee, to Dr. Phyllis Stabeno at Phyllis.Stabeno@noaa.gov, stating the serial number that is stamped on the drifter and the time that it was turned on. This lead-time is necessary to ensure that telemetry from the buoy is being received and transmitted by the Advanced Research and Global Observation Satellite (ARGOS). The method of deployment of the drifter is dependent upon the particular make of drifter and is to be directed by the Chief Scientist, or designee.

3.7 **Underway Operations** – Underway operations that will be performed during this cruise include thermosalinograph, fluorometer, nitrate meter, ADCP, bathymetry up to 3,000 meters at all mooring sites, meteorological data, and a log of operations.

3.7.1 **Acoustic Doppler Current Profiler (ADCP) Operations** – The 38-kHz RD Instrument (RDI) Ocean Surveyor Acoustic Doppler Current Profiler (ADCP) will be used to measure ocean currents below the moving ship. Details concerning its configuration are not finalized because the ADCP was only recently installed. We presume that Dr. Eric Firing will be monitoring the ADCP's initial operation, and we will take guidance from him. The ADCP will probably require navigation input from the Trimble PY-code GPS receiver, heading input from the ship's gyrocompass, and secondary heading input from the POS/MV with gyro-to-POS/MV differences logged via Firing's User Exit program, if possible. Depending upon the availability of differential GPS corrections in our operating area, we might opt for position input from the ship's DGPS receiver. ADCP data should be logged on the operating computer's hard disk or supplementary drive and transferred to CD at cruise end. If the ship has an independent data logging system, we would like position and heading data logged every 10 seconds. This includes NMEA GGA messages from the PY-code GPS and DGPS receivers and NMEA PASHR messages from the POS/MV and the Ashtech ADU.

3.8 **Data Logging** – The ship's data logger, shall operate throughout the cruise, acquiring, and logging data from navigation, meteorological, oceanographic, and bathymetric sensors. If a method for observing data acquisition is available, please provide project scientists with the capability of monitoring sensor acquisition via text and graphic displays. A data processing node should be made available to project scientists throughout the cruise for the above-mentioned purpose.

At regular intervals, not to exceed every five days, the ship's computer manager will archive data from disk files to recordable compact diskettes (CD-R) for delivery to the project representative at the end of the cruise. Additional recording of processed data may be requested of the ship's computer manager. The ship's computer manager will ensure data quality. During the cruise, the scientific party may require the assistance of the ship's computer manager to determine if all sensors are functioning properly and to monitor some of the collected data in real time to make sampling strategy decisions.

3.9 **Seachest and Uncontaminated Seawater** – Sea surface temperature and conductivity will be continuously monitored. Uncontaminated seawater from the Uncontaminated Scientific Seawater System (USSS) will be continuously pumped through the thermosalinograph, fluorometer, and nitrate monitor. Data from these instruments should be sent to the data logger, if possible. Approximately 2 square feet of bench space will be required near a sink with uncontaminated seawater to install the underway nitrate monitor.

The ship’s complement will be responsible for inspecting, and when required, cleaning the seachest and conductivity cells. The scientists will be responsible for regularly cleaning the cuvette, inside the fluorometer, and obtaining and processing the calibration samples. Calibration samples will be taken after each MARMAP Bongo station.

Data logger files will be included in the periodic backup of collected data for distribution at the end of the cruise.

During the cruise, the ship's personnel will be responsible for ensuring that data streams from the instruments are correctly logged by the data logger, checking the logger status display once per watch to determine that the instruments are functioning, and for taking salinity calibration samples every other day.

The scientists also request that the fluorometer be interfaced to the ship's data logger, if possible, and the data logger should be configured to log one-minute data throughout each FOCI cruise, including:

- GPS Time,
- GPS Latitude,
- GPS Longitude,
- Water Depth, in meters,
- Seawater (seachest) Temperature,
- Seawater (seachest) Salinity, and
- Laboratory Fluorometer Voltage

3.10 Small Boat Operations – The small boat will be used to tag the two surface moorings during recovery operations.

4.0 FACILITIES

4.1 Equipment and Capabilities Provided by Ship

- Oceanographic winch with 0.322" electro-mechanical cable with slip rings terminated for CTD operations,
- Oceanographic winch with 0.322" electro-mechanical cable with slip rings terminated for MARMAP Bongo tows,
- A-Frame(s),
- Ability to connect a PAR and Fluorometer, provided by the project, to the CTD,
- Provide termination kits and ship support personnel to do the terminations,
- Wire speed indicators and readout for winches,
- Meter block for plankton tows,
- Electrical connection between winch and Deck computer system,
- Sea-Bird Electronics' SBE 911*plus* CTD system with dual sensors, 12- bottle rosette, stand, deck unit, and weights,
- Sea-Bird Electronics' SBE 911*plus* CTD system without sensors, 24- bottle rosette, stand, deck unit, and weights,
- (16) 9.6-Liter sampling bottles for use with rosette (11 plus 5 spares),
- Refrigerator and freezer space for storage of biological and chemical samples, +4° C (4-cu ft) for nutrients and -20° C (~12-16-cu ft) for chlorophyll samples and frozen nutrients, respectively,
- Flash freezer ~-80°C (4 cu ft) to freeze nutrient samples during the last week of the cruise,
- RD Instruments' ADCP written to disk, if installed,
- For meteorological observations: Anemometers, calibrated air thermometer (wet-and dry-bulb) and a calibrated barometer and/or barograph, interfaced to the data logger if possible,
- Bench space for PCs, monitor, and printer,
- Laboratory space with exhaust hood, sink, lab tables, and storage space,
- Sea-water hoses and nozzles to wash nets and recovered mooring equipment at CTD and Bongo stations,
- Adequate deck lighting for night-time operations,

- Navigational equipment including GPS and radar,
- Safety harnesses for working on quarterdeck and fantail,
- Ship's crane(s) used for loading and/or deploying,
- (2) Hand-held radios for scientific/winch/bridge communications,
- VHF radio with external antenna at CTD computer station,
- Thermosalinograph and fluorometer interfaced with the data logger,
- Continuous uncontaminated Seawater sampling system with debubbler piped from bow into labs,
- Benthos acoustic transducer and deck box,
- EdgeTech 8011AT deck box and transducer (hull-mounted),
- Capability to transfer ship's data to CD-ROM disks,
- Barnstead NANOpure Diamond Analytical System (18MOhm) Projected use (volume/day), and
- Capability to transfer ship's data to Iomega Zip disks or CD-ROM.

4.2 Equipment and Capabilities Provided by Scientists

- Sea-Bird Electronics' SBE 911*plus* CTD system with dual sensors (for backup),
- (2) Sea-Bird Electronics' SBE-19 SEACAT systems,
- Photosynthetically Active Radiation (PAR) and Fluorometer to be mounted on CTD,
- CTD stand modified for attachment of fluorometer,
- CTD carousel sampler,
- (12) 5 liter sample bottles,
- lanyard material and nicropress sleeves,
- 150 salinity sample bottles,
- Fluorometer (spare) to be mounted to the Uncontaminated Scientific Seawater System (USSS),
- Debubbler for the fluorometer,
- Nitrate meter to be mounted to the Uncontaminated Scientific Seawater System (USSS),
- 60-cm MARMAP Bongo sampling arrays,
- 20-cm MARMAP Bongo arrays,
- Spare wire angle indicator,
- (1) Surface mooring (FOCI biophysical platforms),
- 13 Subsurface moorings,
- Benthos acoustic release deck-set and transducer,
- EdgeTech acoustic release deck-set and transducer,
- Approximately 14 railroad wheel sets to be used as anchors,
- Chain, wire rope, rope, assorted hardware for moorings,
- 5 ARGOS satellite tracked drifter buoys,
- (2) Hand held grapple hooks,
- Iridium phone
- (2) Hand-held radios for scientific/winch/bridge communications,
- Miscellaneous scientific sampling and processing equipment,

- Cruise Operations Database (COD) and forms,
- Marine Observation Abstract (MOA) log,
- PMEL CTD Weather Observation Logs, and
- CTD Cast Information/Rosette Log.

5.0 DISPOSITION OF DATA AND REPORTS

5.1 The following data products will be provided by the ship and included in the data package at the end of the cruise:

- Calibration Sheets for all ship's instruments used,
- Files from data logger,
- Electronic Navigation suite's export files on disk,
- ADCP Iomega Zip and/or recordable compact diskette (CD-RW),
- Marine Operations Abstracts (MOA),
- PMEL CTD Weather Observation Logs, and
- ADCP Log Sheets.

5.2 The following data products will be completed by the scientific party:

- CTD Cast Information/Rosette Log,
- ADCP Log Sheets,
- Cruise Operations Database (COD) log sheets, and
- Mooring logs.

6.0 **Pre-cruise Meeting** – A pre-cruise meeting between the ship's representative and the Chief Scientist will be held before the start of the cruise. Its purpose is to identify the day-to-day requirements of the project in order to best utilize shipboard personnel resources and to identify overtime requirements. A brief meeting of all scientific personnel, the ship's officers, deck and marine tech departments, and other relevant ship's personnel should be held before the vessel reaches the operations area for the purposes of:

1. Introducing new scientific personnel to ship's procedures, proper channels, etc.,
2. Discuss operating procedures for deploying various pieces of sampling equipment, and
3. Coordinating scientific watch assignments.

7.0 HAZARDOUS MATERIALS

7.1 **Definition** – Hazardous scientific materials are any substance, which because of its chemical properties can cause the deterioration of the materials or injury to living organisms. Rules for the stowage, labeling, and protection of flammables and other hazardous scientific stores on inspected vessels are given in ***Subchapter U, Title 46 CFR, Part 194***.

7.2 **Standards**

7.2.1 **Storage Containers** – Storage containers should be marked, labeled, and stored in a ventilated and protected area under the supervision of the Chief Scientist with the knowledge and approval of the Master. Consideration should be given to transporting and storing hazardous materials, normally shipped in glass containers, in special, non-breakable containers.

7.2.2 **Working Quantities** – Working quantities only should be stored in the laboratory. A reasonable working quantity would be a one-day supply, considering the hazard posed by the material. Containers should be marked with the material's chemical and common names, type, and classification.

7.2.3 **Storerooms** – Storerooms for chemicals and flammables, where practicable, should be protected by fixed CO_2 or Halon systems, and used for no other purpose. Where it is not practical to provide such a storeroom, consideration should be given to a hazardous material locker appropriate for the type and quantity of material being stored.

7.2.4 **Incompatible Materials** – Because of the limited shipboard storage for hazardous materials, particular attention must be made to avoid storing incompatible materials together. A close review of the Material Safety Data Sheets (MSDS) will show if two chemicals are incompatible.

7.3 **Transportation and Disposal** – The Chief Scientist is responsible for the proper transportation, shipping, and disposal of hazardous materials, including empty containers, associated with their project. Transportation and disposal must be carried out in accordance with Federal, State, and Local regulations. In no case will this responsibility be passed to the ship's crew or operating institution unless specifically arranged in advance.

7.4 **Chemical Spill Response** – The scientific party is responsible for supplying neutralizing agents, buffers, and/or absorbents in the amounts adequate to address spills of a size equal to the amount of any chemicals brought aboard. This spill response material must accompany the chemicals when they come aboard.

7.5 **Inventory List** – See Section 9.1 KM0305 HAZMAT Inventory.

7.6 **Material Data Safety Sheets (MSDS)** – Submitted separately as electronic attachments.

8.0 **COMMUNICATIONS** – For scientific projects, the Chief Scientist, or their designated representative, may have access to the ship's communications systems on a cost reimbursable basis.

8.1 **Satellite Communications** – INMARSAT (voice and facsimile) communications are available aboard ship and may be used for personal or business related calls. Arrangements to pay for the calls must be made before calling. Credit card calls are the preferred method of payment. INMARSAT calls can be extremely expensive and the exact cost may not be known until you receive your bill.

8.2 **Electronic Mail (E-mail)** – FOCI requests that **R/V *KILO MOANA*** transmit e-mail at least twice a day. Each embarked personnel will have an e-mail account and address established in their name by the ship.

8.3 **Receiving Scientific Status Reports** – The Chief Scientist may anticipate the need for daily reports on the position of satellite drifters in the study area and on the status of biophysical mooring(s). These will be sent either by facsimile from PMEL over INMARSAT, IRIDIUM phone (PMEL provided), or over the Internet via e-mail from PMEL.

8.4 Use of Radio Transceivers – Because it is sometimes necessary for the scientific staff to communicate with other research vessels, commercial vessels, and shore based NOAA facilities, the Chief Scientist or designee may request the use of radio transceivers aboard the vessel.

8.5 Important Telephone and Facsimile Numbers and E-mail Addresses

8.5.1 Pacific Marine Environmental Laboratory (PMEL)

FOCI – Ocean Environmental Research Division (OERD2):
- (206) 526-4700 (voice)
- (206) 526-6485 (fax)

Administration:
- (206) 526-6810 (voice)
- (206) 526-6815 (fax)

8.5.2 Alaska Fisheries Science Center (AFSC)

FOCI – Resource Assessment and Conservation Engineering (RACE):
- (206) 526-4171 (voice)
- (206) 526-6723 (fax)

8.5.3 R/V *KILO MOANA*
INMARSAT

8.5.4 University of Hawaii – University Marine Center

8.5.4.1 Marine Superintendent – Stan Winslow

- (808) 847-2661 (voice)
- (808) 848-5451 (fax)
- swinslow@soest.hawaii.edu

8.5.4.2 Shipboard Support Facility Supervisor – Steve Poulos

- (808) 956-6650 (voice)
- (808) 956-9971 (fax)
- poulos@soest.hawaii.edu

9.0 APPENDICES

9.1 KM0305 HAZMAT Inventory

Chemical	CAS Number	Resp.	Qty	H	F	R	Storage Color Code	Hazard Class	Packing Group Number	UN	Rep. Qty.	Rep. Indices
Acetone	67-64-1	Mordy	1.0-l	1	3	0	Flammable	3	II	1090	350 Lb	1
Ammonium Chloride	12125-02-9	Mordy	544.0-g	2	0	0	General	Not regulated		9085	5000 Lb	2
Battery, Lithium	mix	DeWitt	140-cells	1	1	2	General	9	II	3090	None	None
Battery, Lithium/Bromine Chloride	mix	DeWitt	92-cells	1	1	2	General	9	II	3090	None	None
Battery, Alkaline	mix	DeWitt	7-cells				General	Not regulated			None	None
Brij	9002-92-0	Mordy	250.0-ml	0	1	0	General	Not regulated			None	3
Cadmium	7440-43-9	Mordy	20.0-g				Toxic	4.1	III	3178	None	4
Cupper Sulfate	7758-99-8	Mordy	40.0-g	2	0	0	Hazardous	9	III	3077	400 Lb	5
Dowfax	mix	Mordy	200.0-ml				General	Not regulated			None	None
Hydrazine Sulfate	10034-93-2	Mordy	25.0-g	3	1	0	Toxic	8	III	3260	200 Lb	5
Hydrochloric Acid, Solution	7647-01-0	Mordy	5.0-l	3	0	0	Corrosive	8	II	1789	5000 Lb	6
Imidazole	288-32-4	Mordy	136.0-g	3	1	0	Corrosive	8	III	3263	5 Kg	7
Potassium Iodine (Lugols Solution)	mix	Mordy	2.0-l				General	Not regulated				
Magnesium Sulfate Heptahydrate	10034-99-8	Mordy	213.0-g	1	0	0	General	Not regulated			None	2
N-1-Napthylethylenediamine Dihydrochloride	1465-25-4	Mordy	15.0-g	2	1	0	General	Not regulated			None	8
Nitric Acid	7697-37-2	Mordy	150.0-ml	3	0	0	Corrosive	8	II	2031	150 Lb	6
Potassium Nitrate	7757-79-1	Mordy	21.0-g	1	0	0	Reactive	5.1	III	1486	100 Kg	7
Potassium Phosphate	7778-77-0	Mordy	3.0-g	1	0	0	General	Not regulated			None	2
Sodium Bicarbonate	144-55-8	Mordy	5.04-g	1	0	0	General	Not regulated			None	9
Sodium Chloride	7647-14-5	Mordy	963.0-g	1	0	0	General	Not regulated			None	9
Sodium Fluorosilicate	16893-85-9	Mordy	2.4-g	3	0	0	Toxic	6.1	III	2674	None	10
Sodium Hydroxide, 10N	1310-73-2	Mordy	500.0-ml	3	0	1	Store Separately	8	II	1823	1000 Lb	11
Sodium Nitrite	7632-00-0	Mordy	0.5-g	2	0	1	Reactive	5.1 & 6.1	III	1500	100 Lb	12
Stannous Chloride	7772-99-8	Mordy	100.0-g	1	0	0	General	Not regulated		1759	100 Lb	2
Sulfanilamide	63-74-1	Mordy	250.0-g	1	1	0	General	Not regulated			None	2
Sulfuric Acid	7664-93-9	Mordy	6.0-l	3	0	2	Corrosive	8	II	1830	1000 Lb	6
Tributyltin Oxide	56-35-9	DeWitt	30-pairs	3	1	0	Poison	6.1	II	3020	None	13

Spill Response 1: Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, or earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. **Do not flush to sewer!** If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. U.S. Regulations (CERCLA) requires reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the U.S. Coast Guard National Response Center is (800) 424-8802.
Spill Response 2: Ventilate area of leak or spill. Wear appropriate personal protective equipment. Sweep up and containerize for reclamation or disposal. Vacuuming or wet sweeping may be used to avoid dust dispersal. Place material in closed container.
Spill Response 3: Ventilate area of leak or spill. Wear appropriate personal protective equipment. Contain and recover liquid when possible. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer!
Spill Response 4: Evacuate area. Wear Self-Contained Breathing Apparatus (SCBA), rubber boots, and heavy rubber gloves. Wear disposable coveralls and discard them after use. Sweep up, place in bag and hold for waste disposal. Ventilate area and wash spill site after material pickup is complete. Avoid raising dust.
Spill Response 5: Ventilate area of leak or spill. Keep unnecessary and unprotected people away from area of spill. Wear appropriate personal protective equipment. Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust. U.S. Regulations (CERCLA) requires reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the U.S. Coast Guard National Response Center is (800) 424-8802.
Spill Response 6: Ventilate area of leak or spill. Wear appropriate personal protective equipment. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Neutralize with alkaline material (soda ash, lime), then absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. **Do not flush to sewer!** U.S. Regulations (CERCLA) requires reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the U.S. Coast Guard National Response Center is (800) 424-8802.
Spill Response 7: Remove all sources of ignition. Ventilate area of leak or spill. Wear appropriate personal protective equipment. Clean up spills in a manner that does not disperse dust into the air. Use non-sparking tools and equipment. Reduce airborne dust and prevent scattering by moistening with water. Pick up spill for recovery or disposal and place in a closed container.
Spill Response 8: Ventilate area of leak or spill. Wear appropriate personal protective equipment. Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust.

Spill Response 9: Ventilate area of leak or spill. Wear appropriate personal protective equipment. Sweep up and containerize for reclamation or disposal. Vacuuming or wet sweeping may be used to avoid dust dispersal. Small amounts of residue may be flushed to sewer with plenty of water.
Spill Response 10: Keep unnecessary people away. Stay upwind, keep out of low areas. Isolate hazard area and deny entry. Ventilate closed spaces before entering them. Employees should be trained in safety procedures for storage and handling this product. Any personnel in area should wear a National Institute for Occupational Safety and Health (NIOSH) approved breathing apparatus and protective clothing. Isolate product spill area. Carefully shovel material and place in clean, dry container and cover. Remove container from spill site and dispose of in accordance with federal, state and local regulations.
Spill Response 11: Ventilate area of leak or spill. Keep unnecessary and unprotected people away from area of spill. Wear appropriate personal protective equipment. Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust. **Do not flush caustic residues to the sewer!** Residues from spills can be diluted with water, neutralized with dilute acid such as acetic, hydrochloric or sulfuric. Absorb neutralized caustic residue on clay, vermiculite or other inert substance and package in a suitable container for disposal. U.S. Regulations (CERCLA) requires reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the U.S. Coast Guard National Response Center is (800) 424-8802.
Spill Response 12: Remove all sources of ignition. Ventilate area of leak or spill. Wear appropriate personal protective equipment. Clean up spills in a manner that does not disperse dust into the air. Use non-sparking tools and equipment. Reduce airborne dust and prevent scattering by moistening with water. Pick up spill for recovery or disposal and place in a closed container. U.S. Regulations (CERCLA) requires reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the U.S. Coast Guard National Response Center is (800) 424-8802.
Spill Response 13: Stop the leak, if possible. Ventilate the space involved. Absorb, sweep up, and place in container for disposal. Shut off or remove all ignition sources. Prevent waterway contamination. Construct a dike to prevent spreading. Collect run-off (water) and transfer to drums or tanks for later disposal.

9.2 Tables

9.2.1 KM0305 Leg 1 – Mooring Station Locations

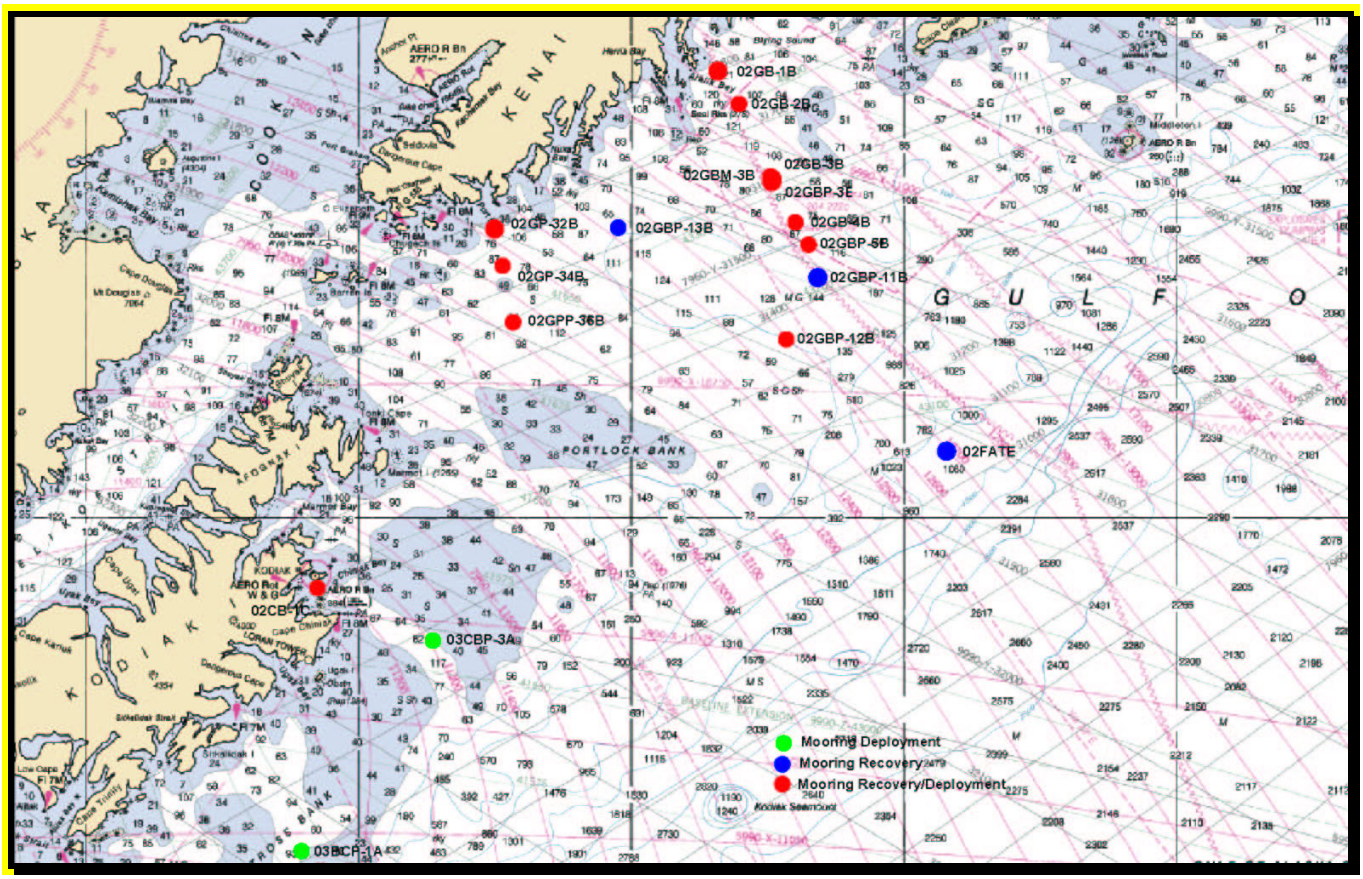
Activity	Latitude	Longitude	Dist. (nm)	Spd (kts)	Transit (hrs)	Approx Depth (m)	On Sta. (hrs)	Arrive (Local) Date/Time	Depart (Local) Date/Time
Depart Kodiak	57° 45.000' N	152° 29.600' W							18-Apr-2003 10:00
CTD CB-1	57° 43.334' N	152° 17.665' W	6.6	10.0	0.7	190	0.5	18-Apr-2003 10:39	18-Apr-2003 11:12
Recover 02CB-1C	57° 43.334' N	152° 17.665' W	0.0	10.0	0.0	190	1.0	18-Apr-2003 11:12	18-Apr-2003 12:12
Deploy 03CB-1A	57° 43.334' N	152° 17.665' W	0.0	10.0	0.0	190	2.0	18-Apr-2003 12:12	18-Apr-2003 14:12
CTD CB-1	57° 43.334' N	152° 17.665' W	0.0	10.0	0.0	190	0.5	18-Apr-2003 14:12	18-Apr-2003 14:44
Night ops	58° 45.011' N	150° 51.998' W	76.4	10.0	7.6	185	9.6	18-Apr-2003 22:23	19-Apr-2003 7:59
CTD at GPP-36	58° 45.011' N	150° 51.998' W	0.0	10.0	0.0	185	0.5	19-Apr-2003 7:59	19-Apr-2003 8:31
Recover 02GPP-36B	58° 45.011' N	150° 51.998' W	0.0	10.0	0.0	185	1.0	19-Apr-2003 8:31	19-Apr-2003 9:31
Deploy 03GPP-36A	58° 45.011' N	150° 51.998' W	0.0	10.0	0.0	185	2.0	19-Apr-2003 9:31	19-Apr-2003 11:31
CTD at GPP-36	58° 45.011' N	150° 51.998' W	0.0	10.0	0.0	185	0.5	19-Apr-2003 11:31	19-Apr-2003 12:03
CTD at GP-34	58° 57.778' N	150° 55.998' W	12.9	10.0	1.3	144	0.5	19-Apr-2003 13:21	19-Apr-2003 13:51
Recover 02GP-34B	58° 57.778' N	150° 55.998' W	0.0	10.0	0.0	144	1.0	19-Apr-2003 13:51	19-Apr-2003 14:51
Deploy 03GP-34A	58° 57.778' N	150° 55.998' W	0.0	10.0	0.0	144	2.0	19-Apr-2003 14:51	19-Apr-2003 16:51
CTD at GP-34	58° 57.778' N	150° 55.998' W	0.0	10.0	0.0	144	0.5	19-Apr-2003 16:51	19-Apr-2003 17:20
CTD at GP-32	59° 06.293' N	150° 59.522' W	8.7	10.0	0.9	157	0.5	19-Apr-2003 18:12	19-Apr-2003 18:43
Recover 02GP-32B	59° 06.293' N	150° 59.522' W	0.0	10.0	0.0	157	1.0	19-Apr-2003 18:43	19-Apr-2003 19:43
Deploy 03GP-32A	59° 06.293' N	150° 59.522' W	0.0	10.0	0.0	157	2.0	19-Apr-2003 19:43	19-Apr-2003 21:43
CTD at GP-32	59° 06.293' N	150° 59.522' W	0.0	10.0	0.0	157	0.5	19-Apr-2003 21:43	19-Apr-2003 22:13
Night ops	59° 06.392' N	150° 04.980' W	28.0	10.0	2.8	174	7.0	20-Apr-2003 1:01	20-Apr-2003 8:01
CTD at GBP-13	59° 06.392' N	150° 04.980' W	0.0	10.0	0.0	174	0.5	20-Apr-2003 8:01	20-Apr-2003 8:33
Recover 02GBP-13B	59° 06.392' N	150° 04.980' W	0.0	10.0	0.0	174	1.0	20-Apr-2003 8:33	20-Apr-2003 9:33
CTD at GB-1	59° 41.668' N	149° 21.484' W	41.6	12.0	3.5	232	0.5	20-Apr-2003 13:01	20-Apr-2003 13:33
Recover 02GB-1B	59° 41.668' N	149° 21.484' W	0.0	10.0	0.0	232	1.0	20-Apr-2003 13:33	20-Apr-2003 14:33
Deploy 03GB-1A	59° 41.668' N	149° 21.484' W	0.0	10.0	0.0	232	2.0	20-Apr-2003 14:33	20-Apr-2003 16:33
CTD at GB-1	59° 41.668' N	149° 21.484' W	0.0	10.0	0.0	232	0.5	20-Apr-2003 16:33	20-Apr-2003 17:05
CTD at GB-2	59° 34.193' N	149° 12.297' W	8.8	10.0	0.9	213	0.5	20-Apr-2003 17:58	20-Apr-2003 18:29
Recover 02GB-2B	59° 34.193' N	149° 12.297' W	0.0	10.0	0.0	213	1.0	20-Apr-2003 18:29	20-Apr-2003 19:29
Deploy 03GB-2A	59° 34.193' N	149° 12.297' W	0.0	10.0	0.0	213	2.0	20-Apr-2003 19:29	20-Apr-2003 21:29
CTD at GB-2	59° 34.193' N	149° 12.297' W	0.0	10.0	0.0	213	0.5	20-Apr-2003 21:29	20-Apr-2003 22:01
Night ops	59° 17.553' N	148° 57.508' W	18.3	10.0	1.8	187	8.3	20-Apr-2003 23:50	21-Apr-2003 8:05

Activity	Latitude	Longitude	Dist. (nm)	Spd (kts)	Transit (hrs)	Approx Depth (m)	On Sta. (hrs)	Arrive (Local) Date/Time	Depart (Local) Date/Time
CTD at GB-3	59° 17.553' N	148° 57.508' W	0.0	10.0	0.0	187	0.5	21-Apr-2003 8:05	21-Apr-2003 8:38
Recover 02GB-3B	59° 17.553' N	148° 57.508' W	0.0	10.5	0.0	187	1.0	21-Apr-2003 8:38	21-Apr-2003 9:38
Deploy 03GB-3A	59° 17.553' N	148° 57.508' W	0.0	10.5	0.0	187	2.0	21-Apr-2003 9:38	21-Apr-2003 11:38
Recover 02GBM-3B	59° 17.999' N	148° 58.218' W	0.6	10.5	0.1	187	4.0	21-Apr-2003 11:41	21-Apr-2003 15:41
Deploy 03GBM-3A	59° 17.999' N	148° 58.218' W	0.0	10.5	0.0	187	4.0	21-Apr-2003 15:41	21-Apr-2003 19:41
Recover 02GBP-3B	59° 17.007' N	148° 57.618' W	1.0	10.5	0.1	187	1.0	21-Apr-2003 19:47	21-Apr-2003 20:47
Deploy 03GBP-3A	59° 17.007' N	148° 57.618' W	0.0	10.5	0.0	187	2.0	21-Apr-2003 20:47	21-Apr-2003 22:47
CTD at GBP-3	59° 17.007' N	148° 57.618' W	0.0	10.5	0.0	187	0.5	21-Apr-2003 22:47	21-Apr-2003 23:19
Night ops	59° 07.697' N	148° 47.174' W	10.7	10.5	1.0	148	8.8	22-Apr-2003 0:21	22-Apr-2003 9:09
CTD at GB-4	59° 07.697' N	148° 47.174' W	0.0	10.5	0.0	148	0.5	22-Apr-2003 9:09	22-Apr-2003 9:38
Recover 02GB-4B	59° 07.697' N	148° 47.174' W	0.0	10.0	0.0	148	1.0	22-Apr-2003 9:38	22-Apr-2003 10:38
Deploy 03GB-4A	59° 07.697' N	148° 47.174' W	0.0	10.0	0.0	148	2.0	22-Apr-2003 10:38	22-Apr-2003 12:38
CTD at GB-4	59° 07.697' N	148° 47.174' W	0.0	10.0	0.0	148	0.5	22-Apr-2003 12:38	22-Apr-2003 13:08
CTD at GBP-5	59° 02.575' N	148° 41.662' W	5.9	10.0	0.6	197	0.6	22-Apr-2003 13:43	22-Apr-2003 14:17
Recover 02GBP-5B	59° 02.575' N	148° 41.662' W	0.0	10.0	0.0	197	1.0	22-Apr-2003 14:17	22-Apr-2003 15:17
Deploy 03GBP-5A	59° 02.575' N	148° 41.662' W	0.0	10.0	0.0	197	2.0	22-Apr-2003 15:17	22-Apr-2003 17:17
CTD at GBP-5	59° 02.575' N	148° 41.662' W	0.0	10.0	0.0	197	0.6	22-Apr-2003 17:17	22-Apr-2003 17:50
CTD at GBP-11	58° 55.281' N	148° 37.186' W	7.6	10.0	0.8	258	0.6	22-Apr-2003 18:36	22-Apr-2003 19:09
Recover 02GBP-11B	58° 55.281' N	148° 37.186' W	0.0	10.0	0.0	258	1.0	22-Apr-2003 19:09	22-Apr-2003 20:09
Night ops	58° 41.000' N	148° 50.940' W	16.0	10.0	1.6	2400	10.3	22-Apr-2003 21:44	23-Apr-2003 7:59
CTD at GBP-12	58° 41.000' N	148° 50.940' W	0.0	10.0	0.0	211	0.5	23-Apr-2003 7:59	23-Apr-2003 8:31
Recover 02GBP-12B	58° 41.000' N	148° 50.940' W	0.0	10.0	0.0	211	1.0	23-Apr-2003 8:31	23-Apr-2003 9:31
Deploy 03GBP-12A	58° 41.000' N	148° 50.940' W	0.0	10.0	0.0	211	2.0	23-Apr-2003 9:31	23-Apr-2003 11:31
CTD at GBP-12	58° 41.000' N	148° 50.940' W	0.0	10.0	0.0	211	0.5	23-Apr-2003 11:31	23-Apr-2003 12:02
CTD at FTM-1	58° 15.477' N	147° 40.711' W	44.7	12.0	3.7	2400	2.1	23-Apr-2003 15:45	23-Apr-2003 17:49
Recover 02FATE	58° 15.477' N	147° 40.711' W	0.0	10.0	0.0	2400	4.0	23-Apr-2003 17:49	23-Apr-2003 21:49
Deploy 03BCP-1A	56° 40.796' N	152° 24.257' W	179.4	12.0	15.0	142	2.0	24-Apr-2003 12:46	24-Apr-2003 14:46
CTD at BCP-1	56° 40.796' N	152° 24.257' W	0.0	10.0	0.0	142	0.5	24-Apr-2003 14:46	24-Apr-2003 15:16
Deploy 03CBP-3A	57° 30.886' N	151° 26.641' W	59.1	12.0	4.9	146	2.0	24-Apr-2003 20:11	24-Apr-2003 22:11
CTD at CBP-3	57° 30.886' N	151° 26.641' W	0.0	10.0	0.0	146	0.5	24-Apr-2003 22:11	24-Apr-2003 22:41
Weather day	57° 30.886' N	151° 26.641' W	0.0	10.0	0.0		30.0	24-Apr-2003 22:41	26-Apr-2003 4:41
Arrive Kodiak	57° 45.000' N	152° 29.600' W	36.5	10.0	3.7			26-Apr-2003 8:20	

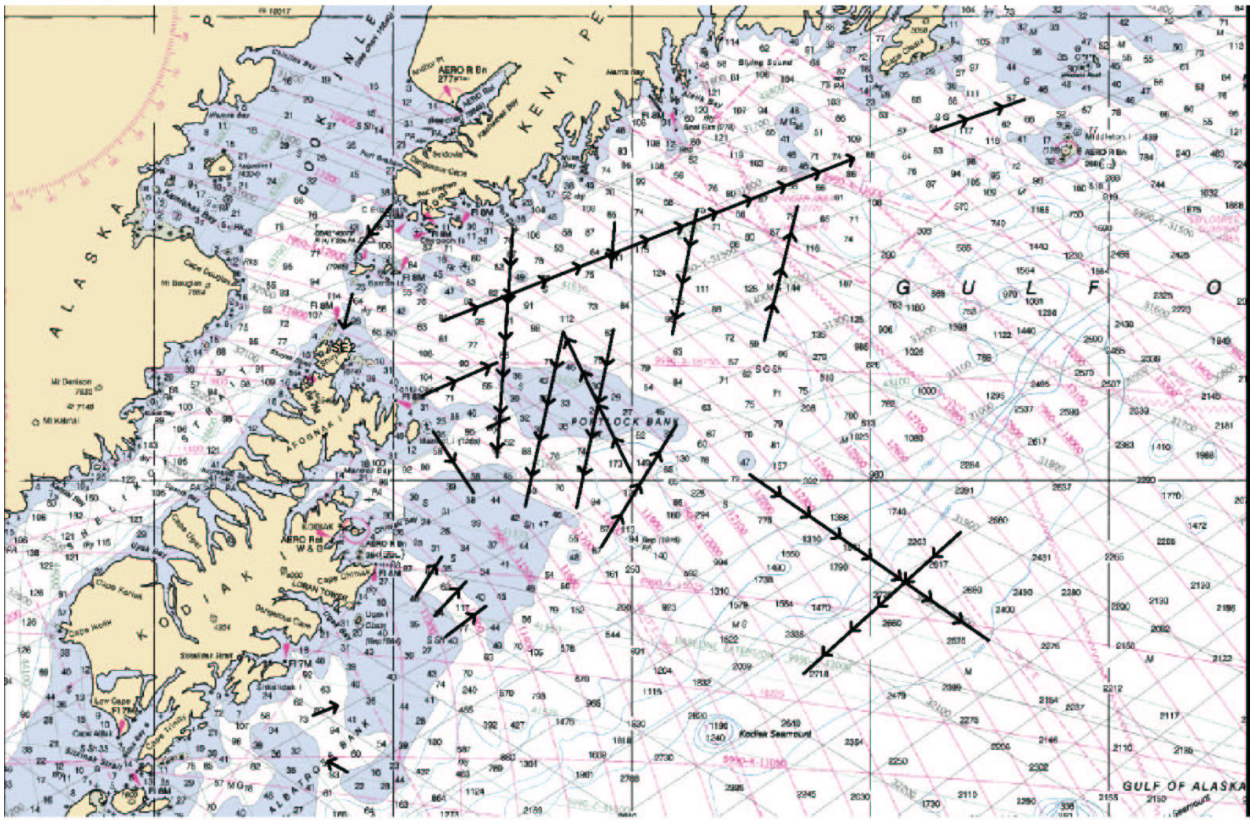
9.2.2 <u>KM0305 Leg 2 – Transect Station Locations</u> – Will be provided at a later date.

9.3 Figures

9.3.1 KM0305 Leg 1 – Mooring Locations



9.3.2 KM0305 Leg 2 – Transect Lines



9.3.3 **<u>TOPEX POSEIDON Altimetry Data from June 1, 2002</u>** – Showing the position of a Gulf of Alaska eddy impinging on the study area. The recurrence of such an eddy near this location would alter the cruise plan, so we may study it.